



OS33B-1782 - Living Spaces: Quantifying Morphological Differences in *Acropora* spp. Corals Using 3D Photogrammetry



Wednesday, 11 December 2019



13:40 - 18:00



Moscone South - Poster Hall

Abstract

Since the 1980s, *Acropora cervicornis* and *Acropora palmata* corals have been declining worldwide, but their F1 hybrid *Acropora prolifera* has been increasingly observed on Caribbean reefs. *A. cervicornis* is a branching framework builder abundant in back reef waters, while the sturdier *A. palmata* dominates reef crests. The bush-like hybrid of these species, *A. prolifera*, has been found in areas common to both parents, which raises questions about the impacts of increased *A. prolifera* on reef habitats. We used photogrammetry to create digital 3D models of representative acroporid corals at Coral Gardens, a patch reef south of Ambergris Caye, Belize. Next, we used digital measures to determine the total surface area of living and dead coral framework. *A. prolifera* had the highest total surface area, with 3.3 - 3.4 m² per square meter, based on the area of the footprint of the coral colony. These values are 43 - 49% more than those for *A. cervicornis* (2.3 m² per square meter) and 9 - 13% higher than for *palmata* (2.9 m² per square meter). We also characterized available space within colonies by subtracting the volume of coral from the volume of the smallest polygon containing the colony. *A. cervicornis* contained the most available space (0.96 m³ per cubic meter) and *A. palmata* the least (0.89 m³ per cubic meter); *A. prolifera* had an intermediate range (0.91 - 0.95 m³ per cubic meter). However, this metric does not account for the size distribution of available spaces; *A. prolifera* grows more densely than *A. cervicornis* and *A. palmata*, so the available space is distributed among a larger number of smaller spaces. Abundance of *Echinometra viridis* urchins, herbivores that live within coral framework, were determined in patches of *A. cervicornis* and *A. prolifera* using m² quadrats. Urchin populations were more dense in *A. prolifera* (averaging 31.7 urchins/m²; n = 25) compared with those in *A. cervicornis* (21.4 urchins/m², n = 140) but urchins within *A. prolifera* also appeared smaller in size than those within *A. cervicornis*. These results suggest that the different surface areas, structural complexities, and size distributions of open spaces of acroporids each impose unique constraints on the size and movement of species that seek food and protection within the coral framework.

Authors

Mattea Horne

Pomona College

Jolie Villegas

Wesleyan University

Sydney Walters

Colgate University

David Pfaff

Washington and Lee University

Ginny Johnson

Washington and Lee University

Karl R Wirth

Macalester College

Lisa Greer

Washington and Lee University